

THREAD SWITCH CIRCUIT DESIGN AND SIGNAL ENCODING FOR VERTICAL THREADING

ABSTRACT

A method and apparatus for implementing vertical multi-threading in a microprocessor without implementing additional signal wires in the processor has been developed. The method uses a pre-existing signal to serve as a multi-function signal such that the multi-function signal can be used for clock enable, clock disable, and scan enable functions. The single multi-function signal exhibits multiple functionalities as needed by a flip-flop to operate in a plurality of modes. The method allows for the use of a pre-existing signal wire to be used as a process thread switch signal that would otherwise have to be explicitly hard-wired in the absence of the multi-functioning signal. The method further includes allowing multiple-bit flip-flops to be placed at sequential stages in a pipeline in order to facilitate vertical multi-threading and, in effect, increase processor performance. The apparatus provides means for distinguishing between specific characteristics exhibited by the multi-function signal. The apparatus further provides means for generating intermediary signals within a control block and then generating output signals to a data storage block. The apparatus also involves generating timing signals to a plurality of flip-flops dependent upon the behavior of the multi-function signal.